COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Agricultural Sciences
ACADEMIC UNIT	Biosystems & Agricultural Engineering
LEVEL OF STUDIES	Undergraduate
COURSE CODE	BAE_802 **SEMESTER** 8th
COURSE TITLE	ELECTRONIC- MICROPROCESSORS & CONTROL SYSTEMS IN AGRICULTURE

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g., lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	2	
Laboratory	0	
TOTAL	**5**	**5**
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	Specialized general knowledge
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	In Greek and in English for Erasmus students
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes
The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.
Consult Appendix A
• *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
• *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
• *Guidelines for writing Learning Outcomes*

The objective of the course is the thorough examination of the theory and the practice of Semi Conductors Transistors, Rectifiers, Digital Electronics and Microprocessors. In order to achieve that, the basic theory of electronics is combined with Microprocessors technology in agriculture control systems.

After the successful completion of the course, the students will be able to understand the fundamental concepts of Semi Conductors Transistors, Rectifiers, Digital Electronics and Microprocessors

General Competences
Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
	Respect for difference and multiculturalism
	Respect for the natural environment
Adapting to new situations	*Showing social, professional and ethical responsibility and*
Decision-making	*sensitivity to gender issues*

Working independently	*Criticism and self-criticism*
Team work	*Production of free, creative and inductive thinking*
Working in an international environment	*……*
Working in an interdisciplinary environment	*Others…*
Production of new research ideas	*…….*

In general, upon completion of this course the student will have further developed the following general skills (from the list above):

Search, analysis and synthesis of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Respect for the natural environment
Exercise criticism and self-criticism

(3) SYLLABUS

The course involves study of:

SEMICONDUCTORS AND RECTIFIERS **(2 weeks)**
Classification of solids based on energy band theory-Intrinsic semiconductors-Extrinsic semiconductors-p type and n type-pn junction-Zener effect-Zener diode characteristics-Half wave and full wave rectifiers -Voltage regulation.

TRANSISTORS AND AMPLIFIERS **(3 weeks)**
Bipolar junction transistor- CB, CE, CC configuration and characteristics-Biasing circuits-Class A, B and C amplifiers- Field effect transistor-Configuration and characteristic of FET amplifier-SCR, Diac, Triac, UJT-Characteristics and simple applications-Switching transistors-Concept of feedback-Negative feedback-Application in temperature and motor speed control.

DIGITAL ELECTRONICS **(3 weeks)**
Binary number system - AND, OR, NOT, NAND, NOR circuits-Boolean algebra- Exclusive OR gate - Flip flops-Half and full adders-Registers-Counters-A/D and D/A conversion.

8085 MICROPROCESSOR **(2 weeks)**
Block diagram of microcomputer-Architecture of 8085-Pin configuration-Instruction set-Addressing modes-Simple programs using arithmetic and logical operations.

MICROPROCESSORS IN CONTROL SYSTEMS **(1 week)**
Integration of semiconductor devices and inexpensive microprocessors, memory chips and analog-to-digital converters to use computers as integral parts of control systems

 INTERFACING AND APPLICATIONS OF MICROPROCESSOR IN AGRICULTURE **(2 weeks)**
Basic interfacing concepts - Interfacing of Input and Output devices-Applications of microprocessor Temperature control, Stepper motor control, control panel.

TUTORIALS
Semiconductors and Rectifiers
Transistors and Amplifiers
Digital Electronics
8085 Microprocessor
Interfacing and Applications of Microprocessor in Agriculture

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face deliveries. Laboratory exercises in Physical Chemistry
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	• Use of ICT (power point) in Teaching • Use of ICT (power point & MATLAB) in Tutorial Training

Use of ICT in teaching, laboratory education, communication with students	• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).

TEACHING METHODS *The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. The student's study hours for each learning activity are given as well as the hours of non directed study according to the principles of the ECTS*	**Activity**	**Semester workload**
	Lectures	39
	Tutorials	26
	Writing short reports of laboratory exercises	13
	Final Exams	3
	Study hours and preparation for the laboratory exercises and the final examination	44
	Course total	**125**

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure Language of evaluation, methods of evaluation, summative or conclusive, multiple-choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem. 3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(5) LITERATURE

Recommended Literature:
- Βιβλίο [50655968]: Ηλεκτρονική, 8η Έκδοση, Malvino A., Bates D.
- Βιβλίο [13944]: ΨΗΦΙΑΚΑ ΟΛΟΚΛΗΡΩΜΕΝΑ ΚΥΚΛΩΜΑΤΑ: ΜΙΑ ΣΧΕΔΙΑΣΤΙΚΗ ΠΡΟΣΕΓΓΙΣΗ, JAN M. RABAEY, ANANTHA CHANDRAKASAN, BORIVOJE NIKOLIC
- Βιβλίο [22768243]: ΜΙΚΡΟΕΠΕΞΕΡΓΑΣΤΕΣ ΚΑΙ ΣΧΕΔΙΑΣΜΟΣ ΜΙΚΡΟΫΠΟΛΟΓΙΣΤΙΚΩΝ ΣΥΣΤΗΜΑΤΩΝ, ΝΙΚΟΛΑΟΣ Χ. ΠΕΤΡΕΛΛΗΣ, ΓΕΩΡΓΙΟΣ Φ. ΑΛΕΞΙΟΥ Λεπτομέρειες
- Βιβλίο [50656010]: Μικροεπεξεργαστές, Παπάζογλου Παναγιώτης Λεπτομέρειες
- Βιβλίο [68380792]: Μικροηλεκτρονική, 5η Έκδοση-Βελτιωμένη, Jaeger Richard - Blalock Travis, Αλκιβιάδης Χατζόπουλος (επιμέλεια)
- Βιβλίο [45396]: Ολοκληρωμένη Ηλεκτρονική, ΤΟΜΟΣ Α, Χαλκιάς Χρήστος Χ.,Millman Jacob

- Related academic journals:
1. Malvino and Leach, Digital Principles and Applications, Tata McGraw-Hill, 1996
2. Mehta V.K, Principles of Electronics, S. Chand and Company Ltd, 1994
3. Dougles V.Hall, Microprocessor and Interfacing, Programming and Hardware, Tata McGraw-Hill, 1999.

4. Salivahanan S, Suresh Kumar N, Vallavaraj A, "Electronic Devices and Circuits" First Edition, Tata McGraw-Hill, 1999.